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## PATENT ABSTRACTS OF JAPAN

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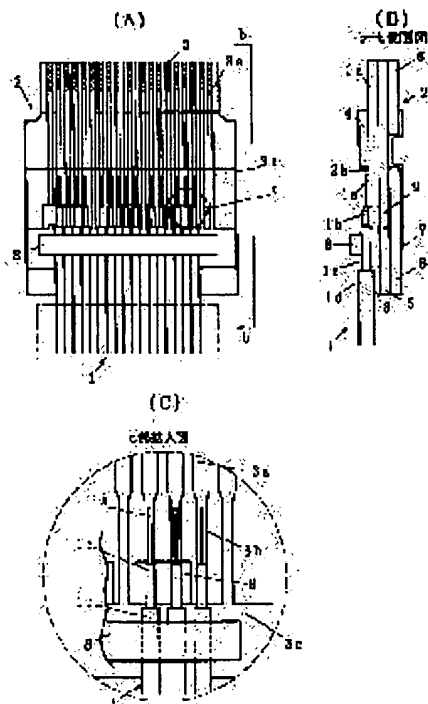
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### (54) MULTI-CORE WIRING MEMBER WITH CONNECTING MEMBER AND MANUFACTURING METHOD FOR MULTI-CORE WIRING MEMBER



#### (57) Abstract:

**PROBLEM TO BE SOLVED:** To provide a multi-core wiring member connectable directly to a connector as the mating party without installing any connector at the connecting ends of a number of coaxial electric wires and furnished with a connection piece which is in shield connection.

**SOLUTION:** The multi-core wiring member is equipped with connection piece 2 connected with at least one-side ends of a number of coaxial electric wires 1, wherein the connection piece 2 is formed by joining a number of connecting conductors 3 onto a hard resin film b through a heat resistant resin film 5 in the specified arrangement pattern, and one-side ends of the connecting conductors 3 are exposed so that they touch the terminal of another connection piece to generate electric connection while the other ends are connected with the inner conductors 1a of the coaxial wires 1, and the outer conductors 1c of the coaxial wires 1 are put in common connections by a grounding bar conductor 8.

### CLAIMS

#### [[claim(s)]]

[[claim 1]] It is the connection figure multi-core wiring member of many coaxial electric wires which connected the connection object to the end at least. Join a conductor on a rigid resin film through a heat-resistant resin film by the predetermined array pattern, and it is constituted. said connection object -- much connection -- One edge of a conductor is exposed so that the contact terminal of other connection objects may be contacted and electrical connection may be carried out. said connection -- the other-end section connects with the inner conductor of said coaxial electric wire -- having -- the outer conductor of the coaxial electric wire of said large number -- a touch-down bar -- the connection figure multi-core wiring member characterized by making common connection with a conductor.

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[[Claim 2]] The connection figure multi-core wiring member according to claim 1 characterized by preparing the shielding conductor layer in the external surface of said hard film.

[[Claim 3]] said connection -- the connection figure multi-core wiring member according to claim 1 or 2 characterized by forming more narrowly than the conductor width of one [ said ] edge of the side by which electrical connection is carried out to other connection objects the conductor width of said other-end section of the side to which the electric wire of a conductor is connected.

[[Claim 4]] said connection -- the conductor of one [ said ] edge of the side by which electrical connection is carried out to other connection objects of a conductor -- the conductor of said other-end section of the side to which, as for an array pitch, an electric wire is connected -- the connection figure multi-core wiring member according to claim 1 or 2 characterized by being formed more greatly than an array pitch.

[[Claim 5]] It is a connection figure multi-core wiring member given in any 1 term of claims 1-4 characterized by forming said heat-resistant resin film by polyimide or the polyamide, and forming said rigid resin film with polyethylene terephthalate (PET).

[[Claim 6]] It is the manufacture approach about the connection figure multi-core wiring member of many coaxial electric wires which connected the connection object to the end at least. Said connection object band-like conductive foil -- partial -- piercing -- a predetermined array pattern -- much connection, after leaving the part which forms a conductor The array pattern of a conductor is made to hold. a heat-resistant-resin film -- joining -- said connection -- Join and rigid-body-ize a rigid resin film after this, and subsequently, from said band-like conductive foil, pierce said connection object and it is formed. One edge of a conductor is exposed so that the contact terminal of other connection objects may be contacted and electrical connection may be carried out. said connection -- the outer conductor of the coaxial electric wire of said large number after connecting the other-end section with the inner conductor of said coaxial electric wire -- a touch-down bar -- the manufacture approach of the connection figure multi-core wiring member characterized by making common connection with a conductor.

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**DETAILED DESCRIPTION**

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[[Detailed Description of the Invention]]

[[0001]]

[[Field of the Invention]] This invention relates to the connection figure multi-core wiring member used as wiring material of information-machines-and-equipment products, such as a notebook sized personal computer, a portable telephone, and a medical-application device, or an electronic equipment product, and its manufacture approach.

[[0002]]

[[Description of the Prior Art]] As for the electronic information machines and equipment represented with a notebook sized personal computer and a portable telephone, small [ much more ] and lightweight-ization are demanded with low cost-ization. wiring in these electronic information machines and equipment -- many signal lines -- as much as possible -- printed-circuit-izing -- or it tape-izes, and simplification of an assembly is attained while attaining contraction-ization of a wiring tooth space.

[[0003]] Passive circuit elements inside the plane and connection with a

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printed circuit are usually made through the many-items child connector. When it is prepared for the both sides by the side of passive circuit elements, a printed circuit, and a signal line, for example, a male connector is prepared in a printed circuit side, a many-items child connector prepares a female mold connector in a signal-line side, and forms electrical connection by fitting of both connectors.

[[0004]] A signal line is bundled, or it arranges and tape-izes to a single tier, and the signal line of a large number by which airframe wiring is carried out can attain contraction-ization of a wiring tooth space. However, terminal spacing for the insulation between that terminal and a wire jointing is needed, and, as for a many-items child connector, for this reason, there is a limit in the miniaturization of a connector. Therefore, as long as the wiring member which used the connector for airframe wiring is used, there is a limit in contraction-ization of the tooth space in a device, and the large miniaturization of the electronic equipment itself is difficult.

[[0005]] Then, the male side of a connector is formed by the printed wired board, and the wiring member which made solder connection of the tape electric wire etc. is known by this (for example, refer to JP,53-133181,U).

Drawing 11 is drawing showing the outline of the aforementioned wiring member, carries out connection immobilization of the end of the tape electric wire 23, and is constituted by the printed wired board 22. a being [ a printed wired board 22 / rigid ] or flexible insulating-substrate 22a top -- wiring -- a conductor -- 22b -- forming -- one conductor -- an edge -- connector connection 22c -- carrying out -- the conductor of another side -- the edge is made into 22d of connections with the tape electric wire 23. By using this wiring member, contraction-izing of the wiring tooth space of electronic equipment, lightweight-ization, etc. can be enabled.

[[0006]] However, multi-functionalization of electronic information machines and equipment and advanced features are called for increasingly, and the cross talk prevention between transmission signals is indispensable. For this reason, the coaxial electric wire which equipped wiring in a device with the shielding conductor layer is used abundantly. When carrying out airframe wiring of the coaxial electric wire through a connector, it is easy to produce the electric shielding tear by the connector area. Even if the many-items child connector using the above-mentioned printed wired board can attain the miniaturization of a connector, electric shielding cannot take it easily structurally, and sufficient shielding connection cannot be made.

[[0007]]

[Problem(s) to be Solved by the Invention] This invention makes it a technical problem to offer the wiring member equipped with the connection object by which was made in view of the situation mentioned above, and could connect with the other party connector directly, without preparing a connector in the end connection of many coaxial electric wires, and shielding connection was made.

[[0008]]

[Means for Solving the Problem] This invention is the connection figure multi-core wiring member of many coaxial electric wires which connected the connection object to the end at least. Join a conductor on a rigid resin film through a heat-resistant resin film by the predetermined array pattern, and it is constituted. a connection object -- much connection -- connection -- one edge of a conductor is exposed so that the contact terminal of other connection objects may be contacted and electrical connection may be

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carried out, and the other-end section connects with the inner conductor of a coaxial electric wire -- having -- the outer conductor of many coaxial electric wires -- a touch-down bar -- it is characterized by making common connection with a conductor.

[[0009]] This invention is the manufacture approach about the connection figure multi-core wiring member of many coaxial electric wires which connected the connection object to the end at least. Moreover, a connection object band-like conductive foil -- partial -- piercing -- a predetermined array pattern -- much connection, after leaving the part which forms a conductor. The array pattern of a conductor is made to hold. a heat-resistant-resin film -- joining -- connection -- Join and rigid-body-size a rigid resin film after this, and subsequently, from band-like conductive foil, pierce a connection object and it is formed. connection -- the outer conductor of the coaxial electric wire of a large number after exposing one edge of a conductor so that the contact terminal of other connection objects may be contacted and electrical connection may be carried out, and connecting the other-end section with the inner conductor of a coaxial electric wire -- a touch-down bar -- it is characterized by making common connection with a conductor.

[[0010]]

[[Embodiment of the Invention]] Drawing explains the gestalt of operation of this invention. Drawing 1 is drawing showing the outline of a connection, in drawing 1 (A), a top view and drawing 1 (B) show a b-b side elevation, and drawing 1 (C) shows the c section enlarged drawing. In addition, in order to clarify a configuration, drawing 1 (B) exaggerates a part of thickness of a component, and is shown. the inside of drawing, and 1 -- a coaxial electric wire and 2 -- a connection object and 3 -- connection -- a conductor, and 4 and 5 -- a heat-resistant resin film and 6 -- a rigid resin film and 7 -- a shielding conductive layer and 8 -- a touch-down bar -- a conductor and 9 show a punching hole. The coaxial electric wire 1 is the thing of a configuration of having covered inner conductor 1a with insulator 1b, having covered the outside with outer-conductor 1c, and having covered external surface with 1d of jackets which consist of a coloring insulating material further.

[[0011]] the connection object 2 -- connection -- the rigid resin film 6 which maintenance immobilization was carried out by thermal melting arrival at the heat-resistant resin films 4 and 5, such as a polyamide film and a polyimide film, and formed the conductor 3 in one heat-resistant resin film 5 side by PET (polyethylene terephthalate) etc. is stuck, and it rigidity-izes, and is constituted. Moreover, conductive foil etc. is stuck on the external surface of the rigid resin film 6, the shielding conductive layer 7 is formed, and electric shielding of a part from which outer-conductor 1c of the coaxial electric wire 1 was removed is performed. furthermore, the outer-conductor 1c part of the coaxial electric wire 1 -- a touch-down bar -- while making common connection using a conductor 8 and covering and carrying out electric insulation of the outside using a protection film or a tape (not shown), the coaxial electric wire 1 is kept back on the connection object 2.

[[0012]] much connection -- a conductor 3 pierces the conductive good conductive foil with which tin or solder plating was performed, and it carries out thermal melting arrival to the heat-resistant resin films 4 or 5. this connection -- a conductor 3 is formed by the parallel array pattern which is in agreement with the array pitch of the contact terminal of the other party connector which connects. for obtaining good electrical

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connection with the contact terminal of an other party connector -- connection -- the conductor width of a conductor 3 is enlarged as much as possible. however, the connection which adjoins a wire-jointing side if the array pitch of the contact terminal by the side of a connector is small and remains as it is -- spacing between conductors 3 may not be enough in such a case, it is shown in drawing 1 (C) -- as -- connection -- the conductor by the side of the connector joint of a conductor 3 -- section 3a -- receiving -- the conductor by the side of a wire jointing -- the width of face of section 3b is narrowed, and spacing and electric insulation required for solder connection of a signal line etc. are obtained.

[[0013]] connection -- a conductor 3 is common to the manufacture process -- a conductor -- as the punching hole 9 shows, it pierces partially with the heat-resistant resin film 5, and common, after connecting with section 3c and sticking on the heat-resistant resin film 5 by thermal melting arrival -- a conductor -- it divides from section 3c and considers as the conductor for signals. the connection by which common connection is made, without being divided -- a conductor is used as the object for ground connection, or a conductor for shielding. in addition -- although not shown by drawing 1 -- the conductor by the side of a connector joint -- section 3a is also common to a manufacture process -- a conductor -- after connecting with section 3c and sticking the rigid resin film 6 -- punching etc. -- each connection -- it is divided as a conductor.

[[0014]] inner conductor 1a of the coaxial electric wire 1 removes covering of insulator 1b, and is exposed -- having -- connection -- the conductor of a conductor 3 -- connection immobilization is carried out by soldering or thermocompression bonding at section 3b. As for outer-conductor 1c of the coaxial electric wire 1, only predetermined die length is removed from on insulator 1b for the insulation from inner conductor 1a. many coaxial electric wires 1 are arranged in a single tier, and common in the edge part of outer-conductor 1c -- a conductor -- the location of section 3c -- a touch-down bar -- it stops collectively with a conductor 8. a touch-down bar -- a conductor 8 is common in both ends -- a conductor -- connection immobilization is carried out with soldering at section 3c. thereby, common in outer-conductor 1c of many coaxial electric wires -- a conductor -- section 3c and a touch-down bar -- ground connection can be formed with a conductor 8. moreover, a touch-down bar -- the bonding strength of the coaxial electric wire 1 and the connection object 2 can be heightened by giving a clamp function to a conductor 8. Adhesion immobilization of the 1d of the jackets of a coaxial electric wire is carried out by adhesives at the heat-resistant resin film 5.

[[0015]] Drawing 2 is drawing showing the gestalt of other operations. the thing of a configuration of being shown in drawing 1 -- comparing -- the conductor by the side of a connector joint -- only by differing in that the array pitch and conductor width of section 3a' are changed, since other configurations are the same, detail explanation is omitted. connection object 2' of drawing 2 -- connection -- a conductor -- the circuit pattern of 3' -- an interstitial segment -- a flabellate form -- opening -- the conductor by the side of a connector joint -- the array pitch of section 3a -- the conductor by the side of a wire jointing -- it is made larger than the array pitch of section 3b'. moreover, a conductor -- the conductor width of section 3a -- the conductor by the side of a wire jointing -- it should be made larger than the conductor width of section 3b', and should have doubled with the configuration of the contact terminal of the other party connector which connects

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[[0016]] Drawing 3 shows the last gestalt of the wiring member by this invention. the connection part of the coaxial electric wire 1 after connection between the connection object 2 and many coaxial electric wires 1 was made, and a touch-down bar -- the part of a conductor 8 -- a wrap -- it covers with the protection film 20 like, and electric insulating treatment is performed. Moreover, many coaxial electric wires 1 connected to the connection object 2 are put in order and tape-ized to a single tier, or band together with heat-shrinkable tubing 21. In addition, although only one edge side of a coaxial electric wire is shown in drawing 3, the connection object 2 is connected with the gestalt same as the other-end section. In addition, the other-end section may be the form where the conventional connector or the connection object of other gestalten is connected if needed.

[[0017]] The connection object 2 constituted as mentioned above can be formed as a connection object of the edge mold (male) with which the width of face at the time of putting in order and tape-izing many coaxial electric wires 1 to a single tier and thickness extent were miniaturized extremely. Therefore, the small connector of the jack mold (female mold) used for the connection for the object for FFC (flexible flat cable) or FPC (flexible printed cable) can be used for an other party connector, and a wiring tooth space can be reduced. Moreover, the wiring time amount in a device assembly process is reduced, wiring without skill dependence can be performed, and the assembly of high quality can be performed.

[[0018]] Next, the manufacture flow Fig. shown in drawing 4 explains the example of the connection object by this invention. Drawing 5 which shows each manufacture phase over the connection object 2 shown in drawing 1 - drawing 10 explain serially the detail of each step of this manufacture flow Fig.

[[0019]] the connection which explained step S1 by drawing 1 -- the 1st step for obtaining a conductor 3 -- it is -- much connection -- the array pattern of a homogeneity pitch performs primary punching for a conductor 3. Drawing 5 is drawing showing this primary punching condition, 35 micrometers (50 micrometers and 100 micrometers are used for others) copper foil is used for thickness, and, as for band-like conductive foil 11, 1-micrometer solder plating or tinning is performed to that front face. The pilot hole 12 for carrying out intermittent migration of the band-like conductive foil 11 is formed in both the sides of band-like conductive foil 11 at the predetermined spacing. In addition, the band-like conductive foil 11 bottom shown in drawing is made into the connector joint side which forms connection with a connector, and the bottom is made into the wire-jointing side which connects a coaxial electric wire, and suppose hereafter that it is the same also about drawing 6 - drawing 10.

[[0020]] connection -- as a conductor 3 -- the conductor by the side of a connector -- the width of face h1 of section 3a -- 0.35mm -- carrying out -- connection -- if the array pitch of a conductor is set to 0.5mm -- a conductor -- the spacing h2 of section 3a is set to 0.15mm. in order to, secure spacing and electric insulation for connecting a coaxial electric wire on the other hand -- the conductor by the side of a wire jointing -- the width of face h3 of section 3b -- 0.2mm -- carrying out -- a conductor -- spacing h4 of section 3b is set to 0.3mm. the modification location of a conductor width -- a conductor -- what is necessary is just to select a proper location, although Sections 3a and 3b are carrying out in the mid-position which becomes almost equal At the step of drawing 5, the slot hole 13 which consists of width of face h2 by the side of a connector and

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width of face h4 by the side of a wire jointing is pierced.

[[0021]] connection required for one connection object at step S2 -- a conductor -- in order to decide and carry out unitization of the number, secondary punching of a connection conductor pattern is performed. drawing in which drawing 6 shows this secondary punching condition -- it is -- required connection -- a conductor -- connection of one per number -- a conductor is pierced and removed and the slot hole 14 with big width of face is formed. the example of drawing 6 -- connection of 22 -- a conductor -- a number -- one unit -- carrying out -- the 23rd connection -- the conductor is thinned out.

[[0022]] A heat-resistant resin film is stuck at step S3. Drawing 7 shows the condition of having stuck the heat-resistant resin films 4 and 5. drawing 7 (A) shows drawing on a side front, and drawing 7 (B) shows drawing on a background. drawing 7 (A) shows -- as -- a side front -- connection -- the heat-resistant resin film 4 with a width of face of about 3mm is stuck so that the center section of the conductor may be crossed. the background shown by drawing 7 (B) -- connection -- the whole surface of a conductor -- a wrap -- the heat-resistant resin film 5 is stuck like. as heat-resistant resin films 4 and 5, the film which consists of a glue line with a polyimide of with a thickness of 25 micrometers and a thickness of 30 micrometers uses -- having -- connection -- it is joined to a conductor by thermal melting arrival.

[[0023]] step S4 -- connection -- Miyoshi punching for dividing a conductor into the object for signals and touch-down is performed. Drawing 8 is drawing showing this Miyoshi punching condition, drawing 8 (A) shows drawing on a side front, and drawing 8 (B) shows drawing on a background. the connection by the side of a wire jointing -- a conductor -- the connection which divided the part partially with the punching hole 9, and was divided -- the connection which is not divided by making a conductor into signals -- a conductor is carried out to touch-down.

[[0024]] At step S5, a rigid resin film is stuck and a connection object is rigid-body-ized. Drawing 9 shows the attachment condition of a rigid resin film, drawing 9 (A) shows drawing on a side front, and drawing 9 (B) shows drawing on a background. A rigid resin film is divided into two, ba and bb, and as drawing 9 (B) shows, from on the heat-resistant resin film 5 on a background, it dissociates, respectively and it is stuck on a connector joint and wire-jointing side. Rigid resin film ba is rigid-body-ized in order to perform the attachment and detachment to an other party connector, and rigid resin film bb is rigid-body-ized for formation of the ground connection of a coaxial electric wire, and a clamp. The film with which thickness consists of a glue line with a PET and a thickness of 30 micrometers which is 188 micrometers or 150 micrometers as rigid resin films ba and bb is used, and it is joined by thermal melting arrival on the heat-resistant-resin film 5. In addition, it cannot be overemphasized that it is the thing of one and a rigid resin film may be formed, without dividing into two, ba and bb.

[[0025]] At step S6, the connection object continuously formed in band-like conductive foil 11 is pierced in a predetermined configuration as a simple substance. In drawing 10 (A), drawing 10 is drawing showing the punching condition of a connection object, drawing and drawing 10 (B) which show the punching range show drawing on the side front after a punch, and drawing 10 (C) shows drawing on the background after a punch. It is put into Rhine of punching so that the slot hole 13 may be crossed in a connector side, it is put in so that a part of body part which the slot hole 13 has not

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attained in a wire-jointing side may be included, and both sides are pierced in the shape of a rectangle as a slot hole 14. this punching -- the connection by the side of a connector -- a conductor is divided from band-like conductive foil 11 -- having -- the connection for the object for signals, and touch-down -- common [ a conductor 3 and for shielding connection ] -- a conductor -- it is divided into 3c.

[[0026]] connection of the coaxial electric wire of step S7, and the touch-down bar of step S8 -- since connection of a conductor and processing of the connection of step S9 are as drawing 1 having explained, they omit explanation. moreover, connection object 2' shown in drawing 2 -- attaching -- connection -- it is formed by the same manufacture approach only by the punching configurations of a conductor differing.

[[0027]]

[[Effect of the Invention]] According to this invention, a connection object can be formed as an edge mold (male) connection object with which the width of face and thickness when putting in order and tape-izing many coaxial electric wires to a single tier were miniaturized extremely so that clearly from the above explanation. Therefore, the small connector of the socket mold (female mold) used for the connection for the object for FFC (flexible flat cable) or FPC (flexible printed cable) can be used for an other party connector, and a wiring tooth space can be reduced. moreover, the outer conductor of many coaxial electric wires -- a touch-down bar -- a conductor -- common connection -- carrying out -- shielding connection -- effective -- it can carry out -- a touch-down bar -- since a coaxial electric wire can be clamped using a conductor, a fixed means is not needed for others, but a configuration can be simplified, and workability is also good.

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**DESCRIPTION OF DRAWINGS**

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[[Brief Description of the Drawings]]

[[Drawing 1]] It is drawing showing the gestalt of operation of this invention.

[[Drawing 2]] It is drawing showing the gestalt of other operations of this invention.

[[Drawing 3]] It is drawing showing the last gestalt of the wiring member of this invention.

[[Drawing 4]] It is drawing showing the manufacture flow of the connection object in this invention.

[[Drawing 5]] It is drawing showing the primary punching condition of the connection conductor pattern in this invention.

[[Drawing 6]] It is drawing showing the secondary punching condition of the connection conductor pattern in this invention.

[[Drawing 7]] It is drawing showing the attachment condition of the heat-resistant resin film in this invention.

[[Drawing 8]] It is drawing showing the Miyoshi punching condition of the connection conductor pattern in this invention.

[[Drawing 9]] It is drawing showing the attachment condition of the rigid resin film in this invention.

[[Drawing 10]] It is drawing showing the punching condition of the connection object in this invention.

[[Drawing 11]] It is drawing showing the conventional wiring member.

[[Description of Notations]]

1 -- a coaxial electric wire, 2 -- connection object, and 3 -- connection -- a conductor, 4, 5 -- heatproof resin film, and 6 -- a rigid resin film, 7 -- shielding conductive layer, and 8 -- touch-down bar -- a conductor



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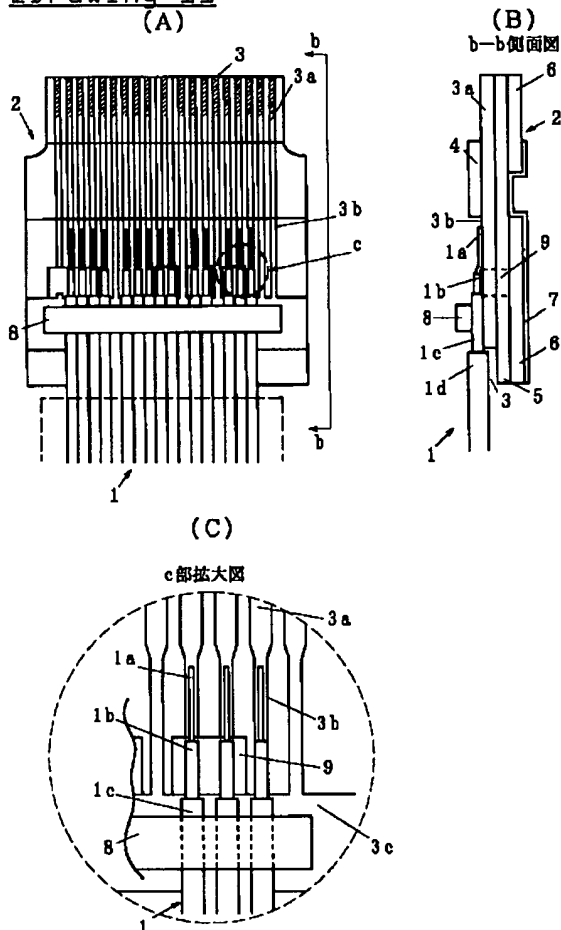
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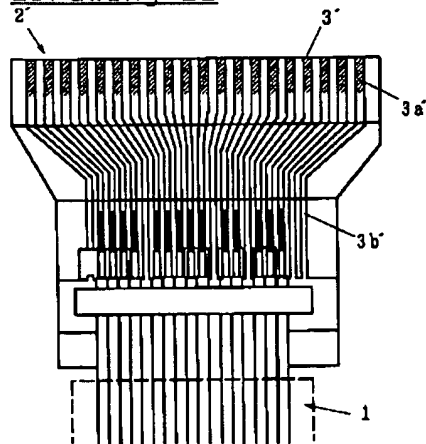
and 9 -- punching hole.

## DRAWINGS

### [[Drawing 1]]



### [[Drawing 2]]



### [[Drawing 3]]

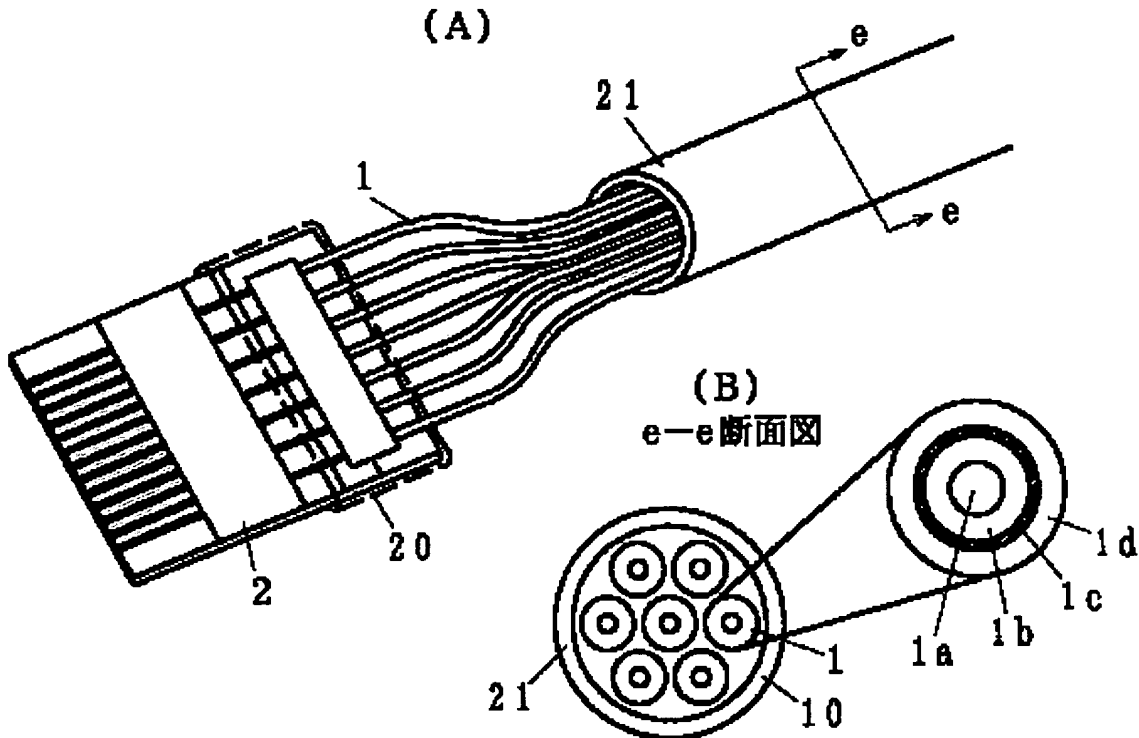
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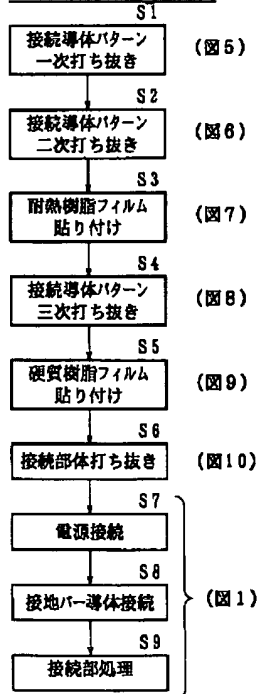
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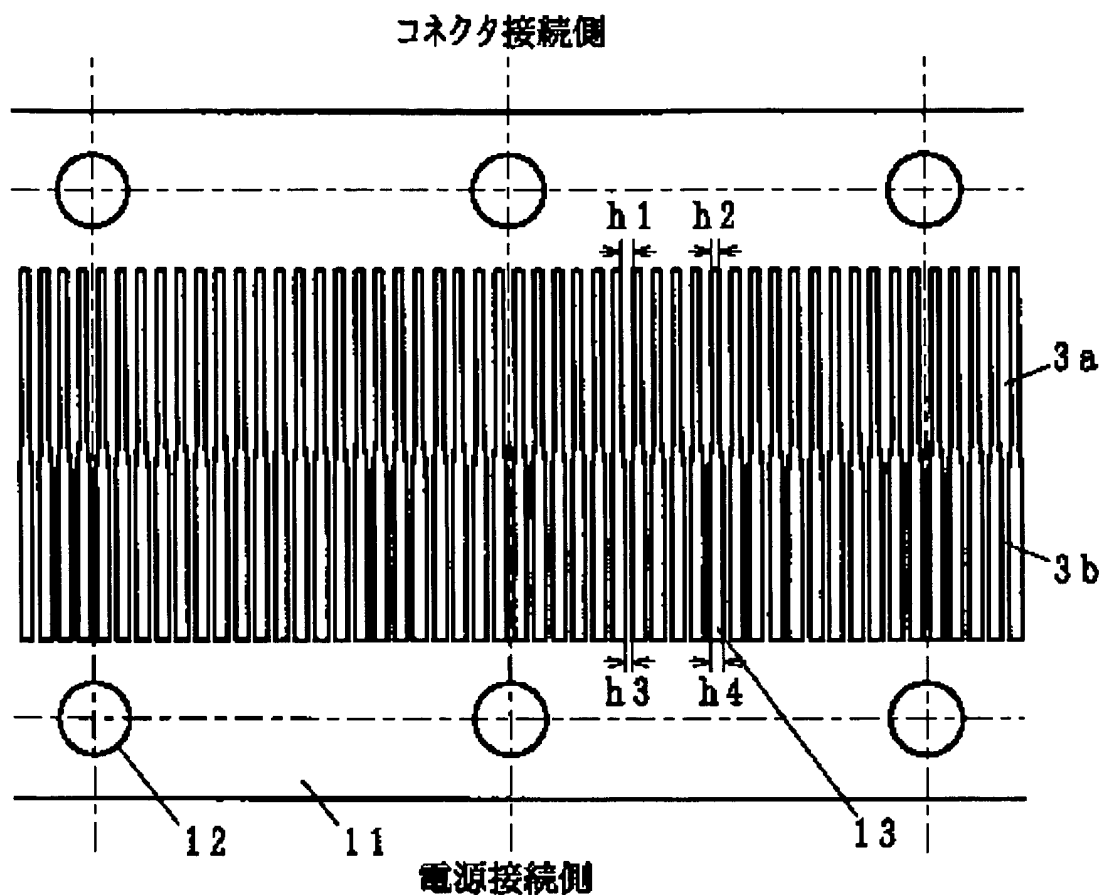
【Drawing 4】



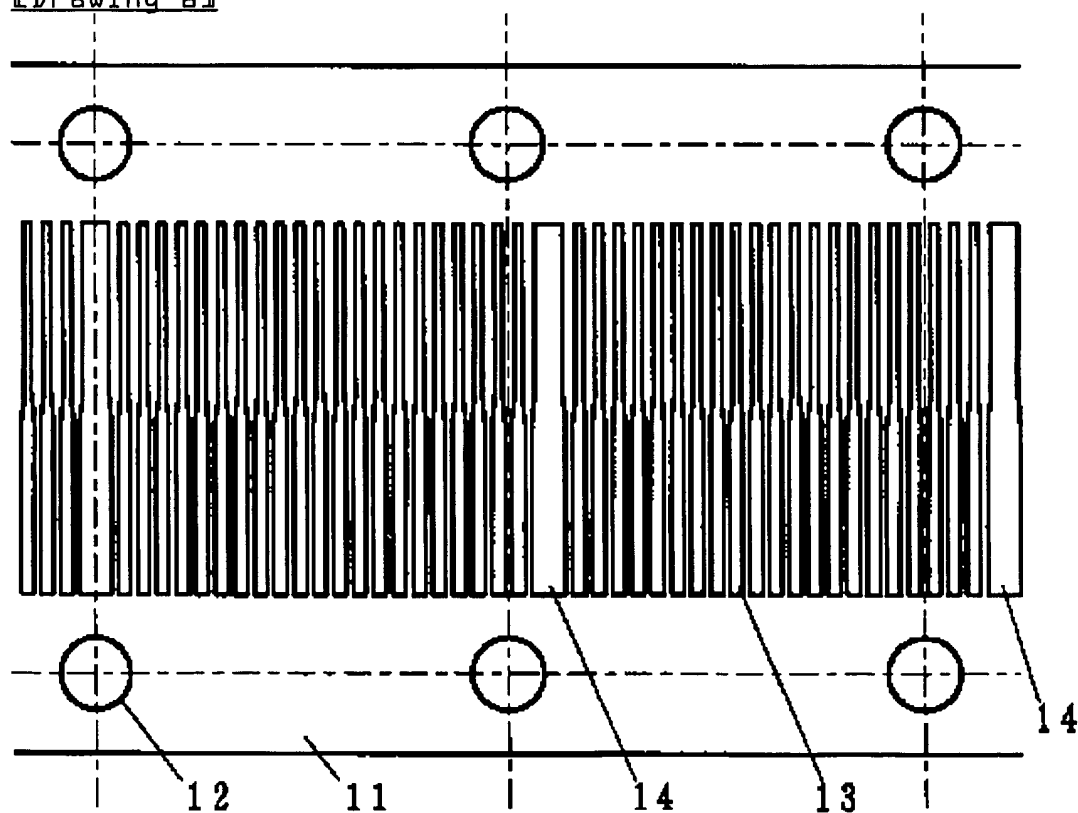
【Drawing 5】

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[[Drawing 6]]



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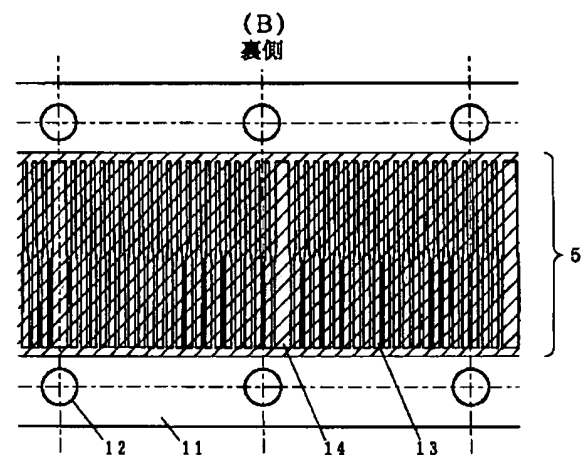
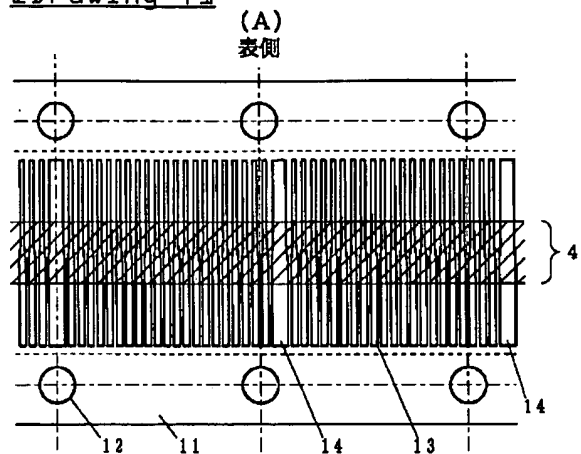
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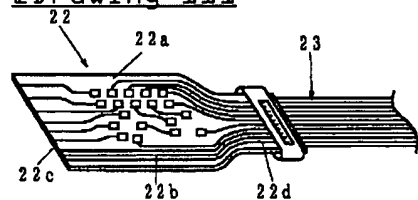
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## [[Drawing 7]]



## [[Drawing 11]]



## [[Drawing 8]]

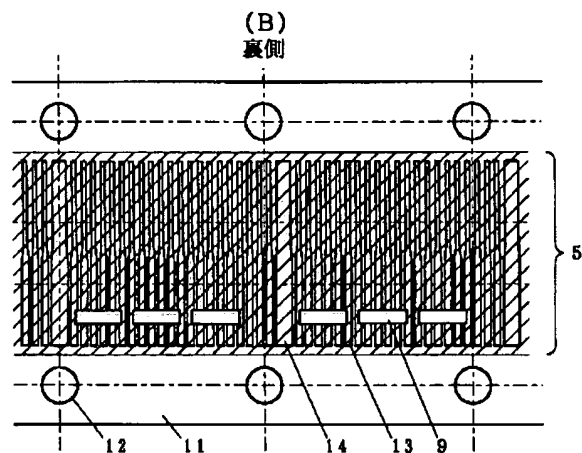
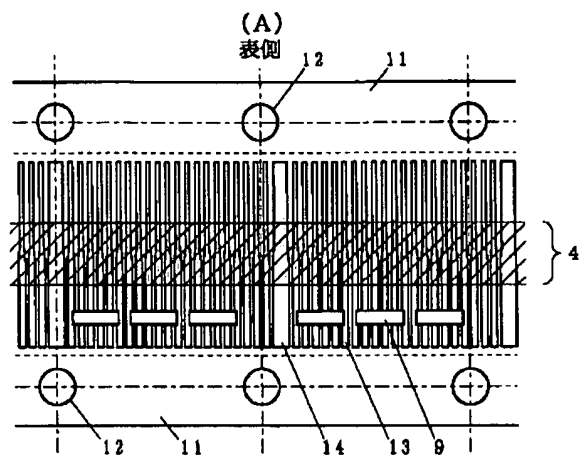
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[[Drawing 9]]

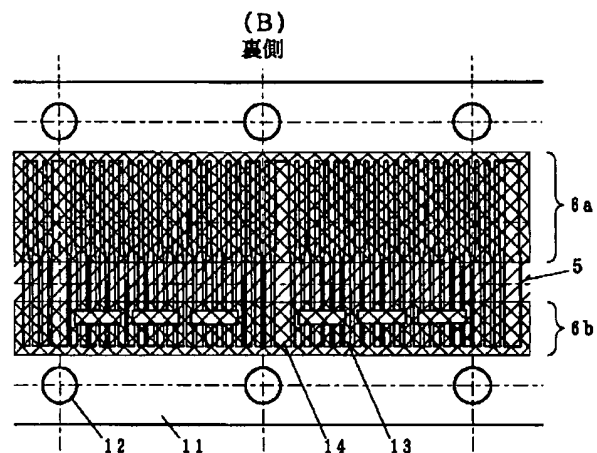
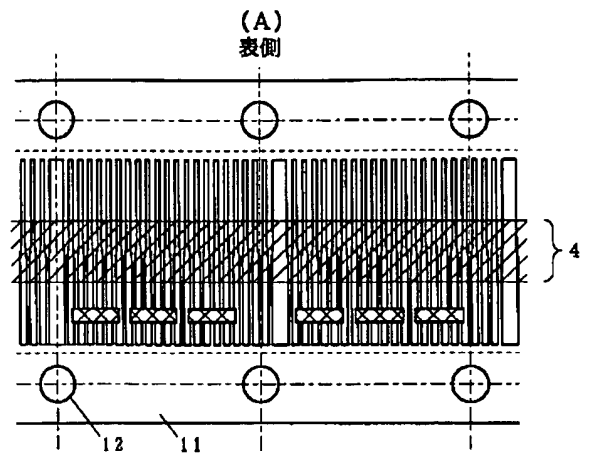
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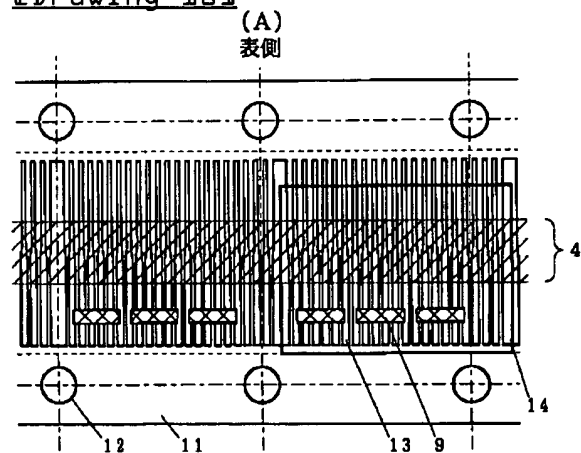
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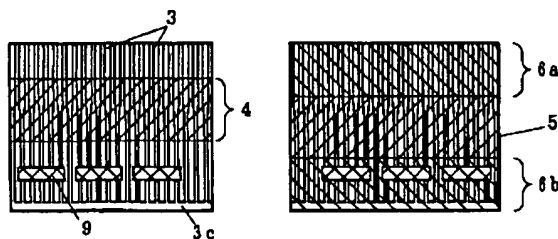


**[[Drawing 10]]**



(B)  
表側

(C)  
裏側



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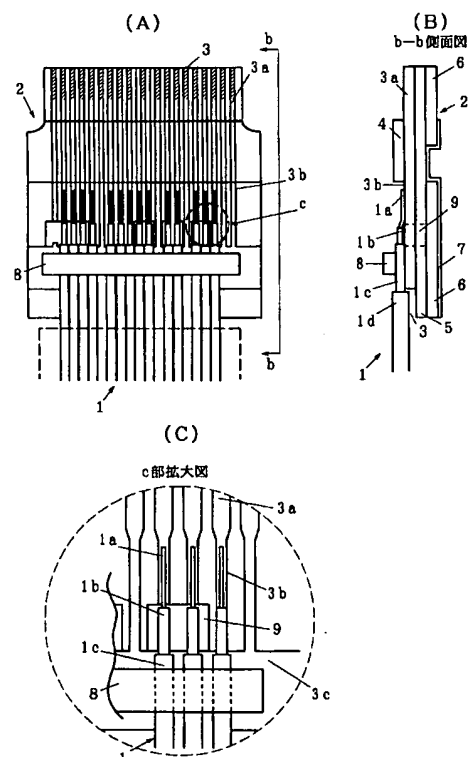
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## (54)【発明の名称】 接続部体付き多心配線部材およびその製造方法

## (57)【要約】

【課題】 多数の同軸電線の接続端にコネクタを設けることなく相手方コネクタに直接に接続でき、かつシールド接続された接続部体を備えた配線部材を提供する。

【解決手段】 多数の同軸電線1の少なくとも一端に接続部体2を接続した接続部体付き多心配線部材であって、接続部体2は多数の接続導体3を所定の配列パターンで耐熱樹脂フィルム5を介して硬質樹脂フィルム6上に接合して構成され、接続導体3の一方の端部は他の接続部体の接触端子と接触して電気接続されるように露出されており、他方の端部は同軸電線1の内部導体1aと接続され、多数の同軸電線1の外部導体1cを接地バー導体8により共通接続する。



## 【特許請求の範囲】

【請求項 1】 多数の同軸電線の少なくとも一端に接続部体を接続した接続部体付き多心配線部材であって、前記接続部体は多数の接続導体を所定の配列パターンで耐熱樹脂フィルムを介して硬質樹脂フィルム上に接合して構成され、前記接続導体の一方の端部は他の接続部体の接触端子と接触して電気接続されるように露出されており、他方の端部は前記同軸電線の内部導体と接続され、前記多数の同軸電線の外部導体を接地バー導体により共通接続することを特徴とする接続部体付き多心配線部材。

【請求項 2】 前記硬質フィルムの外面にシールド導体層が設けられていることを特徴とする請求項 1 に記載の接続部体付き多心配線部材。

【請求項 3】 前記接続導体の電線が接続される側の前記他方の端部の導体幅は、他の接続部体と電気接続される側の前記一方の端部の導体幅より狭く形成されていることを特徴とする請求項 1 または 2 に記載の接続部体付き多心配線部材。

【請求項 4】 前記接続導体の他の接続部体と電気接続される側の前記一方の端部の導体配列ピッチは、電線が接続される側の前記他方の端部の導体配列ピッチより大きく形成されていることを特徴とする請求項 1 または 2 に記載の接続部体付き多心配線部材。

【請求項 5】 前記耐熱樹脂フィルムはポリイミドまたはポリアミドで形成され、前記硬質樹脂フィルムはポリエチレンテレフタレート（PET）で形成されていることを特徴とする請求項 1 から 4 のいずれか 1 項に記載の接続部体付き多心配線部材。

【請求項 6】 多数の同軸電線の少なくとも一端に接続部体を接続した接続部体付き多心配線部材を製造方法であって、前記接続部体は、帯状導体箔を部分的に打ち抜いて所定の配列パターンで多数の接続導体を形成する部分を残した後、耐熱性樹脂フィルムを接合して前記接続導体の配列パターンを保持させ、この後硬質樹脂フィルムを接合して剛体化し、次いで前記帯状導体箔から前記接続部体を打ち抜いて形成され、前記接続導体の一方の端部を他の接続部体の接触端子と接触して電気接続されるように露出させ、他方の端部を前記同軸電線の内部導体と接続した後、前記多数の同軸電線の外部導体を接地バー導体により共通接続することを特徴とする接続部体付き多心配線部材の製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、ノート型パソコン、携帯電話機、医療用機器等の情報機器製品や電子機器製品の配線材として使用する接続部体付き多心配線部材とその製造方法に関する。

## 【0002】

【従来の技術】ノート型パソコン、携帯電話機で代表さ

れる電子情報機器は、低コスト化とともに一層の小型、軽量化が要望されている。これらの電子情報機器内の配線は、多数の信号線を可能な限りプリント回路化あるいはテープ化して、配線スペースの縮小化を図るとともに組立ての簡素化が図られている。

【0003】機内の回路部品やプリント回路との接続は、通常は多端子コネクタを介して行なわれている。多端子コネクタは、回路部品やプリント回路側と信号線側の双方に設けられ、例えば、プリント回路側に雄型コネクタを設けた場合、信号線側には雌型コネクタを設けて、両コネクタの嵌合により電気接続を形成している。

【0004】機内配線される多数の信号線は、信号線を束ねるか、一列に並べてテープ化するなどして配線スペースの縮小化を図ることが可能である。しかし、多端子コネクタは、その端子間絶縁と電線接続のための端子間隔が必要とされ、このためコネクタの小型化には限度がある。したがって、機内配線にコネクタを用いた配線部材を使用する限り、機器内スペースの縮小化には限度があり、電子機器自体の大幅な小型化は困難である。

【0005】そこで、コネクタの雄側をプリント配線板で形成し、これにテープ電線等を半田接続した配線部材が知られている（例えば、実開昭 53-133181 号公報参照）。図 1 は、前記の配線部材の概略を示す図で、プリント配線板 22 にテープ電線 23 の一端を接続固定して構成されている。プリント配線板 22 は、リジットあるいはフレキシブル絶縁基板 22a 上に、配線導体 22b を形成し、一方の導体端部をコネクタ接続部 22c とし、他方の導体端部をテープ電線 23 との接続部 22d としている。この配線部材を用いることにより、電子機器の配線スペースの縮小化、軽量化等を可能にすることができる。

【0006】しかしながら、電子情報機器の多機能化、高機能化がますます求められており、伝送信号間のクロストーク防止が必須となっている。このため、機器内配線にシールド導体層を備えた同軸電線が多用されている。同軸電線をコネクタを介して機内配線する場合、コネクタ部での電気シールド破れが生じやすい。前述のプリント配線板を用いた多端子コネクタは、コネクタの小型化は図れても構造的に電気シールドが取り難く、十分なシールド接続を行なうことができない。

## 【0007】

【発明が解決しようとする課題】本発明は、上述した事情に鑑みてなされたもので、多数の同軸電線の接続端にコネクタを設けることなく相手方コネクタに直接に接続でき、かつシールド接続された接続部体を備えた配線部材を提供することを課題とする。

## 【0008】

【課題を解決するための手段】本発明は、多数の同軸電線の少なくとも一端に接続部体を接続した接続部体付き多心配線部材であって、接続部体は多数の接続導体を所



定の配列パターンで耐熱樹脂フィルムを介して硬質樹脂フィルム上に接合して構成され、接続導体の一方の端部は他の接続部体の接触端子と接触して電気接続されるように露出されており、他方の端部は同軸電線の内部導体と接続され、多数の同軸電線の外部導体を接地バー導体により共通接続することを特徴とする。

【0009】また、本発明は、多数の同軸電線の少なくとも一端に接続部体を接続した接続部体付き多心配線部材を製造方法であって、接続部体は、带状導体箔を部分的に打ち抜いて所定の配列パターンで多数の接続導体を形成する部分を残した後、耐熱性樹脂フィルムを接合して接続導体の配列パターンを保持させ、その後硬質樹脂フィルムを接合して剛体化し、次いで带状導体箔から接続部体を打ち抜いて形成され、接続導体の一方の端部を他の接続部体の接触端子と接触して電気接続されるように露出させ、他方の端部を同軸電線の内部導体と接続した後、多数の同軸電線の外部導体を接地バー導体により共通接続することを特徴とする。

【0010】

【発明の実施の形態】本発明の実施の形態を図により説明する。図1は接続部の概要を示す図で、図1(A)は平面図、図1(B)はb-b側面図、図1(C)はc部拡大図を示す。なお、図1(B)は、構成を明確にするために構成要素の厚さを一部誇張して示してある。図中、1は同軸電線、2は接続部体、3は接続導体、4、5は耐熱樹脂フィルム、6は硬質樹脂フィルム、7はシールド導電層、8は接地バー導体、9は打ち抜き孔を示す。同軸電線1は、内部導体1aを絶縁体1bで被覆し、その外側を外部導体1cで被覆し、さらに外面を着色絶縁材からなる外被1dで被覆した構成のものである。

【0011】接続部体2は、接続導体3をポリアミドフィルム、ポリイミドフィルム等の耐熱樹脂フィルム4と5に熱融着で保持固定され、一方の耐熱樹脂フィルム5側に、PET(ポリエチレンテレフタレート)等で形成した硬質樹脂フィルム6を貼り付け剛性化して構成される。また、硬質樹脂フィルム6の外面に導体箔等を貼り付けてシールド導電層7を形成し、同軸電線1の外部導体1cを除去した部分の電気シールドを行なう。さらに、同軸電線1の外部導体1c部分を接地バー導体8を用いて共通接続し、その外側を保護フィルムまたはテープ等(図示せず)を用いて被覆し電気絶縁するとともに、同軸電線1を接続部体2に引き止める。

【0012】多数の接続導体3は、錫または半田メッキが施された導電性のよい導体箔を打ち抜いて耐熱樹脂フィルム4または5に熱融着する。この接続導体3は、接続する相手方コネクタの接触端子の配列ピッチに一致する平行な配列パターンで形成される。相手方コネクタの接触端子との良好な電気接続を得るには、接続導体3の導体幅はできるだけ大きくする。しかし、コネクタ側の

接触端子の配列ピッチが小さく、そのままでは電線接続側において、隣接する接続導体3間の間隔が十分でない場合がある。このような場合は、図1(C)に示すように、接続導体3のコネクタ接続側の導体部3aに対して、電線接続側の導体部3bの幅を狭め、信号線の半田接続等に必要な間隔と電気絶縁が得られるようにする。

【0013】接続導体3は、その製造過程で共通導体部3cに連結されていて、耐熱樹脂フィルム5に熱融着で貼り付けた後、打ち抜き孔9で示すように耐熱樹脂フィルム5とともに部分的に打ち抜いて、共通導体部3cから分断し信号用の導体とする。分断されずに共通接続されている接続導体は、接地接続用またはシールド用の導体として使用される。なお、図1では示されていないが、コネクタ接続側の導体部3aも製造過程では共通導体部3cに接続されていて、硬質樹脂フィルム6を貼り付けた後に、打ち抜き等により、それぞれの接続導体として分断される。

【0014】同軸電線1の内部導体1aは、絶縁体1bの被覆を除去して露出され、接続導体3の導体部3bに半田付けまたは熱圧着により接続固定される。同軸電線1の外部導体1cは、内部導体1aから絶縁のため所定長さだけ絶縁体1b上から除去される。多数の同軸電線1を一行に並べ、外部導体1cの端部分を共通導体部3cの位置で、接地バー導体8で一括して抑える。接地バー導体8は、両端部を共通導体部3cに半田付けで接続固定する。これにより、多数の同軸電線の外部導体1cを共通導体部3cと接地バー導体8により接地接続を形成することができる。また、接地バー導体8にクランプ機能を持たせることにより、同軸電線1と接続部体2との結合力を高めることができる。同軸電線の外被1dは接着剤により耐熱樹脂フィルム5に接着固定される。

【0015】図2は、他の実施の形態を示す図である。図1に示す構成のものと比べて、コネクタ接続側の導体部3a'の配列ピッチと導体幅を変える点で異なるだけで、他の構成は同じであるので詳細説明を省略する。図2の接続部体2'は、接続導体3'の配線パターンを中間部分で扇状に開き、コネクタ接続側の導体部3aの配列ピッチを、電線接続側の導体部3b'の配列ピッチより大きくしてある。また、導体部3aの導体幅を、電線接続側の導体部3b'の導体幅より大きくし、接続を行なう相手方コネクタの接触端子の構成に合わせたものとしている。

【0016】図3は、本発明による配線部材の最終形態を示す。接続部体2と多数の同軸電線1との接続が行なわれた後、同軸電線1の接続部分および接地バー導体8の部分を覆うように保護フィルム20で被覆し、電気絶縁処理を行なう。また、接続部体2に接続された多数の同軸電線1は、一行に並べてテープ化するかまたは熱収縮チューブ21で結束される。なお、図3には同軸電線の一方の端部側のみを示すが、他方の端部も同じ形態で

接続部体2が接続される。なお、他方の端部は、必要に応じて従来のコネクタまたは他の形態の接続部体を接続する形であってもよい。

【0017】以上のように構成された接続部体2は、多数の同軸電線1を一列に並べてテープ化した場合の幅と厚み程度の極めて小型化されたエッジ型(雄型)の接続部体として形成することができる。したがって、相手方コネクタに、FFC(フレキシブルフラットケーブル)用またはFPC(フレキシブルプリントケーブル)用の接続に用いられるジャック型(雌型)の小型コネクタを用いることができ、配線スペースを減ずることができる。また、機器組立て工程での配線時間を削減し、スキル依存のない配線ができ、高品質の組立てが行なえる。

【0018】次に、本発明による接続部体の具体例について、図4に示す製造フロー図により説明する。この製造フロー図の各ステップの詳細は、図1に示す接続部体2に対する各製造段階を示す図5～図10により逐次説明する。

【0019】ステップS1は、図1で説明した接続導体3を得るための第1段階で、多数の接続導体3を均一ピッチの配列パターンで一次打ち抜きを行なう。図5は、この一次打ち抜き状態を示す図で、帯状の導体箔11は、厚さが $35\mu\text{m}$ (他に、 $50\mu\text{m}$ 、 $100\mu\text{m}$ が使用される)の銅箔が用いられ、その表面には $1\mu\text{m}$ の半田メッキまたは錫メッキが施されている。帯状導体箔11の両サイドには、帯状導体箔11を間欠移送するためのパイロット孔12が所定の間隔で形成されている。なお、図に示す帯状導体箔11の上側をコネクタとの接続を形成するコネクタ接続側とし、下側を同軸電線を接続する電線接続側とし、以下、図6～図10についても同様とする。

【0020】接続導体3として、コネクタ側の導体部3aの幅 $h1$ を $0.35\text{mm}$ とし、接続導体の配列ピッチを $0.5\text{mm}$ とすると、導体部3aの間隔 $h2$ は $0.15\text{mm}$ となる。一方、同軸電線を接続するための間隔と電気絶縁を確保するため、電線接続側の導体部3bの幅 $h3$ を $0.2\text{mm}$ とし、導体部3bの間隔 $h4$ を $0.3\text{mm}$ とする。導体幅の変更位置は、導体部3aと3bがほぼ等しくなる中間位置で行なっているが、適宜の位置を選定すればよい。図5のステップでは、コネクタ側の幅 $h2$ と電線接続側の幅 $h4$ からなるスロット孔13を打ち抜く。

【0021】ステップS2では、一つの接続部体に必要な接続導体数を決めてユニット化するため、接続導体パターンの二次打ち抜きを行なう。図6は、この二次打ち抜き状態を示す図で、必要な接続導体数ごとに一本の接続導体を打ち抜いて除去し、幅の大きなスロット孔14を形成する。図6の具体例では、22本の接続導体数を一ユニットとして、23番目の接続導体を間引いている。

【0022】ステップS3では、耐熱樹脂フィルムの貼り付けを行なう。図7は、耐熱樹脂フィルム4、5を貼り付けた状態を示し、図7(A)は表側の図、図7

(B)は裏側の図を示す。図7(A)で示すように表側には、接続導体の中央部を横切るように、幅 $3\text{mm}$ 位の耐熱樹脂フィルム4を貼り付ける。図7(B)で示す裏側には、接続導体の全面を覆うように耐熱樹脂フィルム5を貼り付ける。耐熱樹脂フィルム4、5としては、厚さ $25\mu\text{m}$ のポリイミドと厚さ $30\mu\text{m}$ の接着層からなるフィルムが用いられ、接続導体に熱融着により接合される。

【0023】ステップS4では、接続導体を信号用と接地用とに分けるための三次打ち抜きを行なう。図8は、この三次打ち抜き状態を示す図で、図8(A)は表側の図、図8(B)は裏側の図を示す。電線接続側の接続導体部分を、打ち抜き孔9により部分的に分断し、分断された接続導体を信号用とし、分断されない接続導体を接地用とする。

【0024】ステップS5では、硬質樹脂フィルムを貼り付け、接続部体を剛体化する。図8は硬質樹脂フィルムの貼り付け状態を示し、図9(A)は表側の図、図9(B)は裏側の図を示す。硬質樹脂フィルムは、6aと6bの2つに分けられ、図9(B)で示すように、裏側の耐熱樹脂フィルム5の上から、コネクタ接続側と電線接続側にそれぞれ分離して貼り付けられる。硬質樹脂フィルム6aは、相手方コネクタへの着脱を行なうために剛体化し、硬質樹脂フィルム6bは、同軸電線の接地接続の形成、クランプのために剛体化する。硬質樹脂フィルム6a、6bとしては、厚さが $188\mu\text{m}$ または $150\mu\text{m}$ のPETと厚さ $30\mu\text{m}$ の接着層からなるフィルムが用いられ、耐熱性樹脂フィルム5上に熱融着により接合される。なお、硬質樹脂フィルムを6aと6bの2つに分けずに、一体のもので形成してもよいことはいくまでもない。

【0025】ステップS6では、帯状導体箔11に連続的に形成される接続部体を、単体として所定の形状に打ち抜く。図10は接続部体の打ち抜き状態を示す図で、図10(A)は打ち抜き範囲を示す図、図10(B)は打ち抜き後の表側の図、図10(C)は打ち抜き後の裏側の図を示す。打ち抜きのラインは、コネクタ側ではスロット孔13を横断するように入れられ、電線接続側ではスロット孔13が達していない本体部分を一部含むように入れられ、両サイドはスロット孔14として、矩形状に打ち抜かれる。この打ち抜きにより、コネクタ側の接続導体は帯状導体箔11から分断され、信号用および接地用の接続導体3とシールド接続用の共通導体3cに分けられる。

【0026】ステップS7の同軸電線の接続、ステップS8の接地バー導体の接続、ステップS9の接続部の処理は、図1で説明したとおりであるので、説明を省略す

る。また、図2に示す接続部体2'については、接続導体の打ち抜き形状が異なるだけで同様な製造方法で形成される。

【0027】

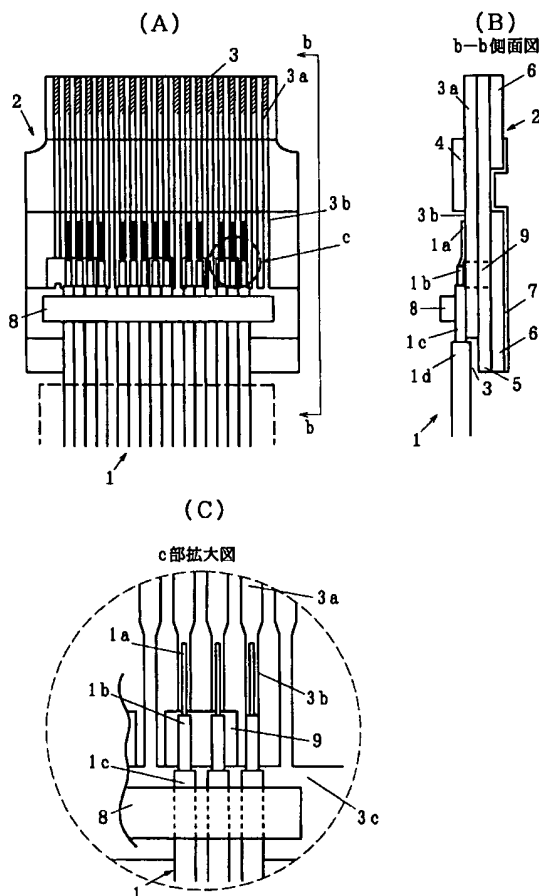
【発明の効果】以上の説明から明らかなように、本発明によれば、接続部体は多数の同軸電線を一行に並べてテープ化したときの幅と厚みの、極めて小型化されたエッジ型（雄型）接続部体として形成することができる。したがって、相手方コネクタに、FFC（フレキシブルフラットケーブル）用またはFPC（フレキシブルプリントケーブル）用の接続に用いられるソケット型（雌型）の小型コネクタを用いることができ、配線スペースを減ずることができる。また、多数の同軸電線の外部導体を接地バー導体により共通接続してシールド接続を効果的に行なうことができ、接地バー導体を利用して同軸電線をクランプすることができるので、他に固定手段を必要とせず、構成を簡素化することができ作業性もよい。

【図面の簡単な説明】

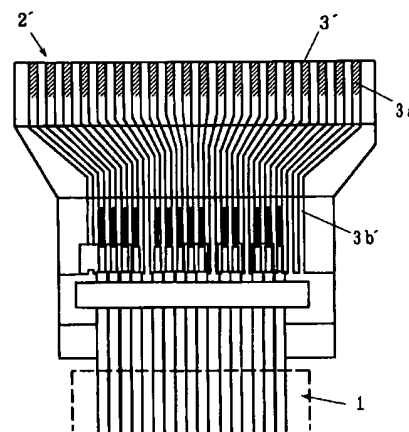
【図1】本発明の実施の形態を示す図である。

【図2】本発明の他の実施の形態を示す図である。

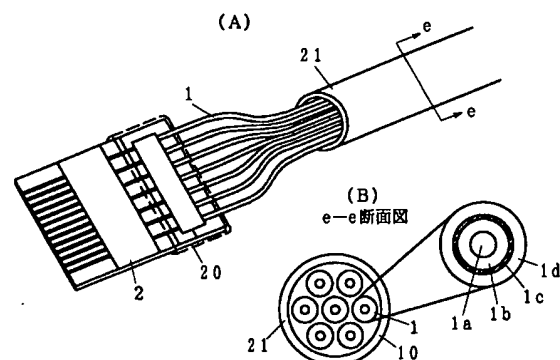
【図1】



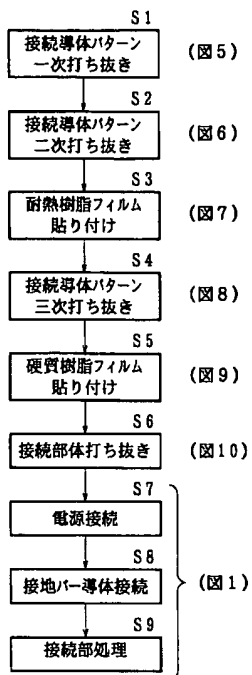
【図2】



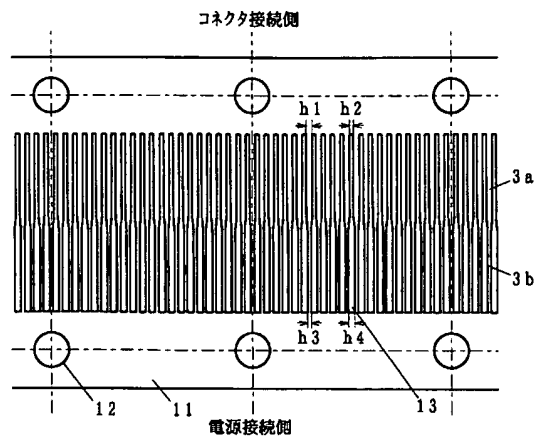
【図3】



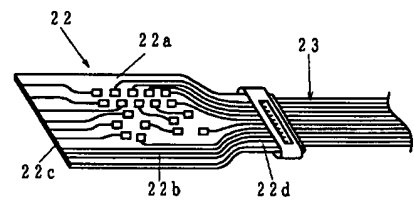
【図4】



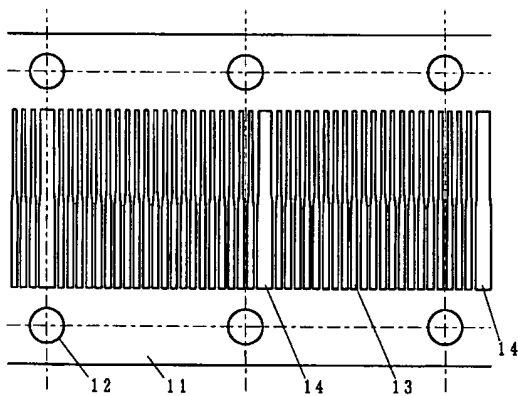
【図5】



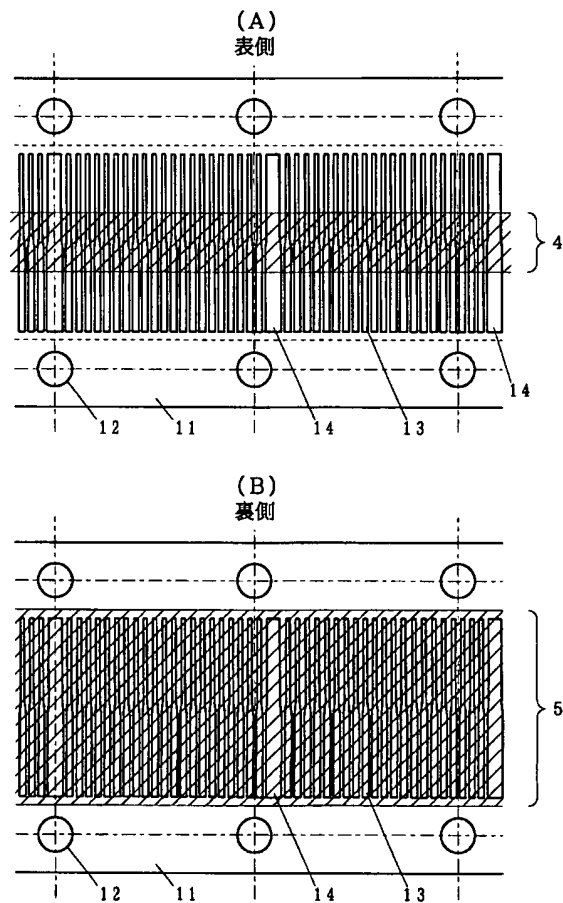
【図11】



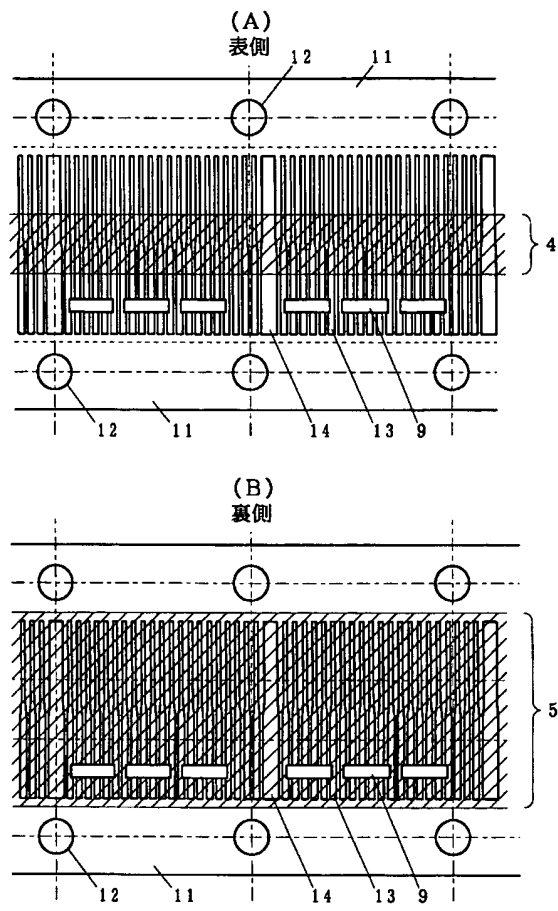
【図6】



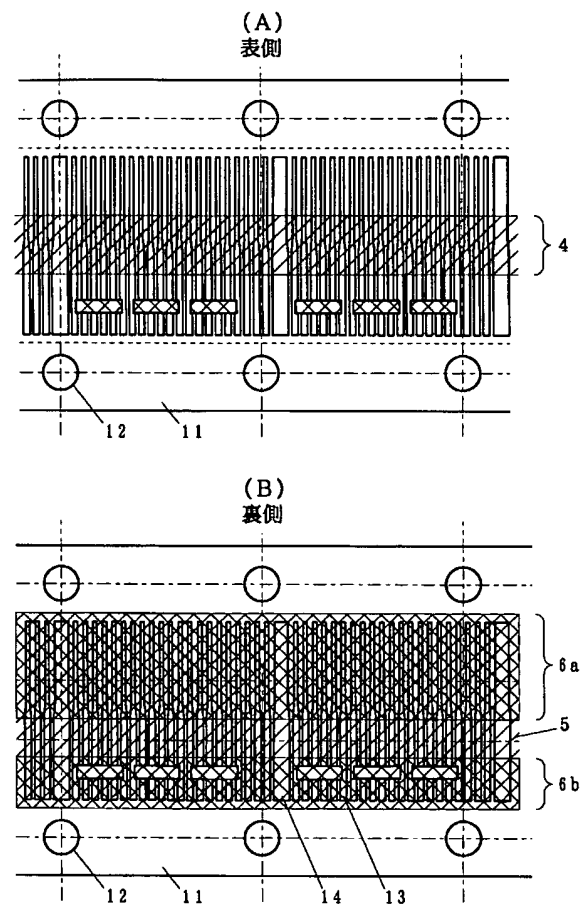
【図7】



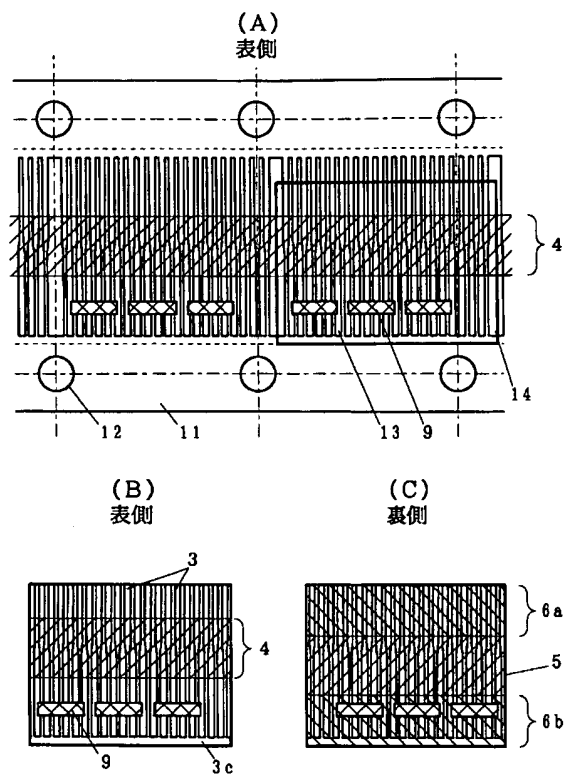
【図8】



【図9】



【図10】



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(51) Int. Cl.<sup>7</sup>

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